Top-down estimate of isoprene emissions in East Asia using inverse modeling: implication of satellite retrievals from GOME-2 and OMI formaldehyde with KORUS-AQ aircraft observations

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We estimate isoprene emissions over East Asia (100°E-140°E and 20°N-50°N) by inverse modeling using an atmospheric chemical transport model (GEOS-Chem) and its adjoint at $0.25° \times 0.3125°$ horizontal resolution. Satellite retrievals of formaldehyde (HCHO) vertical column density from GOME-2 (Global Ozone Monitoring Experiment-2, on board MetOp-B, 40×80 km^2 ground pixel size) and OMI (Ozone Monitoring Instrument, on board AURA, 13×25 km^2) are used. The satellite retrievals are validated with aircraft in-situ measurements from KORUS-AQ campaign conducted from May to Jun 2016. HCHO observation is found to be sensitive to the background methane concentration from recent studies and it is found that the methane emissions over east China has highly overestimated and over Korea has underestimated. Thus, we use updated methane field estimated using optimized methane emissions by GOSAT (Greenhouse gases Observing SATellite) retrieval.